National Aeronautics and
Space Administration

NOT
MEASUREMENT
SENSITIVE

MSFC-PLAN-2784
July 28, 1998

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

MSFC

STATION LIFE SUPPORT PROJECTS OFFICE CONFIGURATION MANAGEMENT PLAN

Prepared by:
Science & Engineering Directorate
Systems Analysis and Integration Laboratory
Configuration Management Division
Projects Support Branch

Release Date:	Marshall Space Flight Center SPECIFICATION/DOCUMENT CHANGE INSTRUCTION	Page. 1 of 1
	Spec./Doc. No. MSFC-PLAN-2784	COPY No.:

Change No/Date	SCN/DCN No./Date	CCBD NoJDate	Replacement Page Instructions
-			Baseline Release

MSFC STATION LIFE SUPPORT PROJECTS OFFICE
CONFIGURATION MANAGEMENT PLAN

7/31/98
Date

Project Support Branch
Configuration Management Division
MSFC

For Kenny Mitchell 7/31/98
Date

Approved by:
Station Life Support Projects Engineering

Scott D Coomes 7/31/98
Date

Approved by:
Station Life Support Projects Office

Table of Contents

List of Figures

List of Tables

Appendices

1.0 SCOPE

The MSFC Station Life Support (SLS) Projects Office Configuration Management Plan defines requirements, responsibilities, and procedures for the configuration management (CM) system which will be applied to the SLS development/integration activities at MSFC. This Projects Office includes several individual Project teams and managers as well as an overall SLS Office Project Manger.

The MSFC SLS Project Managers will identify configurations by baselining technical documentation at progressive project milestones. Through this baselining process, the Project Managers will progress the hardware/software baseline from requirements to detail design to hardware/software products. The managers will control changes to the baseline through the CM System described in this plan.

This plan complies with MMI 8040.15, Configuration Management; MSFC-P04.2, Configuration Management, MSFC Programs; MSFC-STD-555, MSFC Engineering Documentation, SSP 41170, International Space Station Alpha (ISSA) Program Configuration Management Requirements; and SSP 50123, International Space Station Alpha (ISSA) Configuration Management Handbook.

The Project Managers will each develop specific project appendices to this plan for their projects which will include their peculiar project CM requirements. As part of these appendices, they will include document and drawing signature matrices for their in-house documentation.

1.1 Objectives

The CM System provides the project with a formal method to meet the following objectives:

a) Identify and document the technical requirements of all Configuration Items (CI), Computer Software Configuration Items (CSCI) or units.
b) Control changes/deviations/waivers to these technical requirements.
c) Record and report change processing and implementation status.
d) Verify change incorporation.
e) Verify performance, design, and configuration through design reviews and verification documentation.

2.0 APPLICABLE DOCUMENTS

The following documents of the exact issue shown form a part of this plan to the extent specified in the text. Within the text of this plan, reference to the applicable documents listed below is by basic number only.

NPG 7120.5A	NASA Program And Project Management Processes And Requirements Handbook
SSP 30459E	International Space Station Interface Control Plan

SSP 41170, CN2	ISSA Program Configuration Management Requirements
SSP 50123A	ISSA Configuration Management Handbook
NSTS 21000-IDD-ISS	International Space Station Interface
Ch. 4	Definition Document
MMI 8040.15C, Ch. 1	Configuration Management
MM8040.12B	Standard Contractor Configuration Management Requirements, MSFC Programs
MSFC-PLAN-2839	ISS Vapor Compression Distillation Project MSFC In-House Project Plan
MSFC-P04.2	Configuration Management, MSFC Programs
MSFC-PROC-1916	CM Audit for MSFC Programs/Projects
MSFC-STD-555C	MSFC Engineering Documentation Standard
MSFC-UNL-1951	Change Processing, Tracking, and Accounting System User's Guide
MSFC-P13.1-CO1, Rev. A	MSFC Material Review System
MIL-STD-498	Defense System Software Development
MIL-STD-130E	Identification and Marking of U.S. Military Property
MIL-STD-973	Configuration Management
MIL-STD-1521B	Technical Reviews and Audits for Systems, Equipment, and Computer Software
JA21 (98-06)	MSFC SLS Configuration Control Boards Charter
CM-INST-001	CM Instructions for Processing Floor EPLs
CM-INST-003	CM Instructions for processing Floor Eos

3.0 ABBREVIATIONS AND ACRONYMS

BCE	Board Change Evaluation
CAGE	Commercial and Government Entity
CCB	Configuration Control Board
CCBD	Configuration Control Board Directive
CE	Change Evaluation
CI	Configuration Item
CM	Configuration Management
CMO	CM Office
CPE	Change Package Engineer
CPTAS	Change Processing, Tracking, and Accounting System
CSCI	Computer Software Configuration Item
DAR	Deviation Approval Request
DCN	Document Change Notice
DR	Discrepancy Record
DRS	Documentation Release System
ECP	Engineering Change Proposal
ECR	Engineering Change Request
EI	End Item
EO	Engineering Order
ENGR	Engineer
EPL	Engineering Parts List
FEC	Field Engineering Change
FRR	Flight Readiness Review
ICD	Interface Control Document
INC	Installation Notice Card
IDD	Interface Definition Document
ISSA	International Space Station Alpha
JSC	Johnson Space Center
MSFC	Marshall Space Flight Center
MRB	Material Review Board
NASA	National Aeronautics and Space Administration
NSTS	National Space Transportation System
OGS	Oxygen Generator System
PCD	Program Change Directive
PCN	Program Control Number
PDR	Preliminary Design Review
PIRN	Preliminary Interface Revision Notice
S&E	Science & Engineering
SCN	Specification Change Notice
SLS	Station Life Support
SLSP	Station Life Support Projects
SSCB	Space Station Control Board
SSCE	Space Station Change Evaluation

SSCM	Space Station Change Memo
SSCN	Space Station Control Number
SSCR	Space Station Change Request
SSPO	Space Station Program Office
SSR	Software Specification Review
VCD	Vapor Compression Distillation
VRA	Volatile Removal Assembly
WRS	Water Recovery System

4.0 ORGANIZATION

The CM Office verifies that the technical requirements, the design, and the hardware/software are accurately documented and translated to the next development stage. MSFC SLS Project Offce controls requirements and hardware/software definition through their Level III configuration control boards as chartered by memorandum JA21 (98-06). The following paragraphs define the CM responsibilities of the SLS activities at MSFC.

4.1 MSFC SLS Manager

The MSFC SLS Office Manager will authorize and oversee compliance with the policies, requirements, and procedures stated in this plan and shall chair the MSFC SLS Level III Configuration Control Board (CCB).

4.2 MSFC SLS Projects

The MSFC SLS Project Managers shall review all change evaluations and issues through their respective Configuration Control Boards and submit coordinated change requests or evaluations to the SLS CCB for disposition.

4.3 MSFC SLS Support CM Office (CMO) Manager

The CMO is staffed by co-located personnel from the MSFC CM Branch/EL33. The CMO has the following responsibilities:

a) Assist each Project Manager/Team Lead in developing and maintaining this CM Plan and the appendices which outline their specific project CM requirements and operating procedures.
b) Assure the MSFC SLS CM systems are compatible with interfacing programs and the MSFC institutional CM system
c) Provide guidance to MSFC SLS project personnel regarding procedures for baselining, document release, change package preparation, and document maintenance.
d) Provide secretariat support for all SLS CCB's processing change packages, scheduling CCB meetings and documenting CCB decisions.
e) Maintain master change files for CCB actions and all in-house actions.

f) Track change actions using the MSFC Change Processing, Tracking and Accounting System (CPTAS). g) Establish and verify CM requirements for any MSFC SLS contracts.
h) Assist in verifying that hardware/software is fabricated as required using documentation configuration audits.
i) Perform periodic CM Audits to verify adequacy of the CM System.

4.4 Science and Engineering (S&E) Directorate

S&E Office will provide technical support personnel to-the MSFC SLS Projects. Their support will include the following CM responsibilities:

a) Identify and document requirements and detail design in specifications and drawings.
b) Provide membership on the CCB's. -
c) Act as Change Package Engineer (CPE) for a change package when designated by the Chief Engineer.
d) Evaluate change packages as required by CPE's.

4.5 Safety and Mission Assurance (S&MA)

S&MA personnel will provide CM support as specified in the Safety and Mission Assurance Plan for each MSFC SLS project. Their specific responsibilities will include:

a) Provide membership on the CCB's.
b) Act as CPE for S&MA related change packages.

4.6 Program Control

Personnel representing program control will serve to evaluate cost and schedule impacts.

5.0 CONFIGURATION MANAGEMENT PHASING AND MILESTONES

Program phasing and milestones shall be per NPG 7120.5. Specific project milestones shall be as identified in the respective Project Plans.

6.0 DATA MANAGEMENT

The SLS Office will develop a data management plan which will identify the documentation and development schedules required by Section 7.0, Configuration Identification.

7.0 CONFIGURATION IDENTIFICATION

Configuration identification is defined by approved technical documentation which consists of specifications, drawings as well as associated lists, and documents. As part of this function, the MSFC SLS project managers will define individual hardware and software elements in configuration item (CI) or computer software configuration item (CSCI) specifications or an equivalent. After each project review, the baseline CI or CSCI is established and the specific

documentation constituting that baseline is placed under formal control by the Project Manager. Documentation that is submitted to the SSPO for formal baselining will be released under a Space Station Change Number (SSCN).

7.1 Configuration Baselines

Configuration baselines are defined in MSFC-P04.2. Baselines consist of increasingly detailed documentation as the project progresses. The project will establish Functional, Development and Product Baselines or their equivalent, when they have completed the appropriate design reviews.

7.2 Identification Numbers

The CMO will assign identification numbers to control and account for the configuration of all CI's, CSCI's, and related equipment and documentation per the requirements of MSFC-STD-555 for hardware items, MIL-STD-498 for CSCI's, or per contract. Equipment, facilities, and spares shall be identified by nameplates and markings per M1I-STD-130. The markings will depict part numbers, serial numbers or lot numbers, and Commercial and Government Entity (CAGE) codes. If the part is too small, or would be damaged by this identification, or the part is permanently installed in an assembly and is not replaceable as a unit then no markings are required.

7.3 Specification Identification

The project CI or CSCI requirements shall document all CI or CSCI in specifications. The specification format will be determined by the responsible project manager with advice from the CMO. The project specifications shall be baselined and controlled by the CCB.

7.4 Drawing Identification

Project detailed design shall be documented with drawings and associated engineering parts lists (EPL) in accordance with MSFC-STD-555 or per contract for contracted items.

7.5 Release Function -

The purpose of the release function is to ensure that project baselines and changes to those baselines are properly authorized and recorded. The release function typically consists of a database and personnel who ensure that documentation is properly prepared and authorized before becoming official or "released".

At MSFC, the release function is provided by the MSFC Release Desk which is staffed by personnel from the CM DivisionlEL31. Release Desk personnel administer the Documentation Release System (DRS) database. MSFC design activities shall follow release requirements of MSFC-STD-555.

8.0 INTERFACE CONTROL DOCUMENT (ICD) MANAGEMENT

MSFC Level III ICD submittal and change procedures are defined in MSFC-STD-555. SSPO Level ICD management requirements are defined in SSP 41170 and SSP 30459. See paragraph 9.6 for change processing.

9.0 CONFIGURATION CONTROL

Configuration control is the systematic definition, evaluation, coordination, and disposition of each proposed change, deviation, or waiver, and the implementation of each approved change in the project configuration. A formal change control system shall be established for the management of the MSFC SLS configurations. All changes to the configuration baselines shall be formally controlled as specified in Sections 9.1-9.9.

Specifications and drawings, which define hardware/software requirements and design, shall become part of the formal project baseline. Other types of project documentation such as management plans shall be controlled as defined by the SLS Manager. Specifications and other technical requirements documents shall be submitted by Engineering Change Request (ECR) or by Engineering Change Proposal (ECP) for CCB baselining after all technical coordination is accomplished. After formal baselining, MSFC specifications and documents can only be changed by submitting an ECR/ECP with a Specification/Document Change Notice (SCNIDCN) as an attachment. MSFC change submittal and replacement page procedures are defined in MSFCSTD-555. Contractor submittals shall be per the contract.

Prior to drawing release, drawings are controlled by the developing engineer with no CM oversight. Changes to MSFC drawings will be processed via the CCB in accordance with the guidelines of Figure 1. Signature authority for drawings, revisions, EO's and EPL's will be as specified in each project appendix. Baseline control of contractor drawings will be accomplished in accordance with approved contractual configuration management plans.

9.1 Control Levels of Changes

The control of programmatic changes, engineering changes, deviations and waivers to MSFC SLS hardware/software will be achieved through the use of a multilevel control system Project Offices are the functional bodies responsible for change control and shall be established at each control level for the managemqnt of the baseline requirements.

The levels of authority, and office of responsibility, established for the MSFC SLS projects are as follows:

Program Manager, Space Station Program Office (SSPO), JSC
Manager, MSFC SLS Project
Project Manager of each SLS Project

The controls established at each level are described in the subsequent sections and represented in Figure 2. The Space Station Program has not chartered a Level I CCB. The SLS Projects have not chartered Level IV CCB's, all Level IV CCB functions will be handled by the responsible Project CCB.

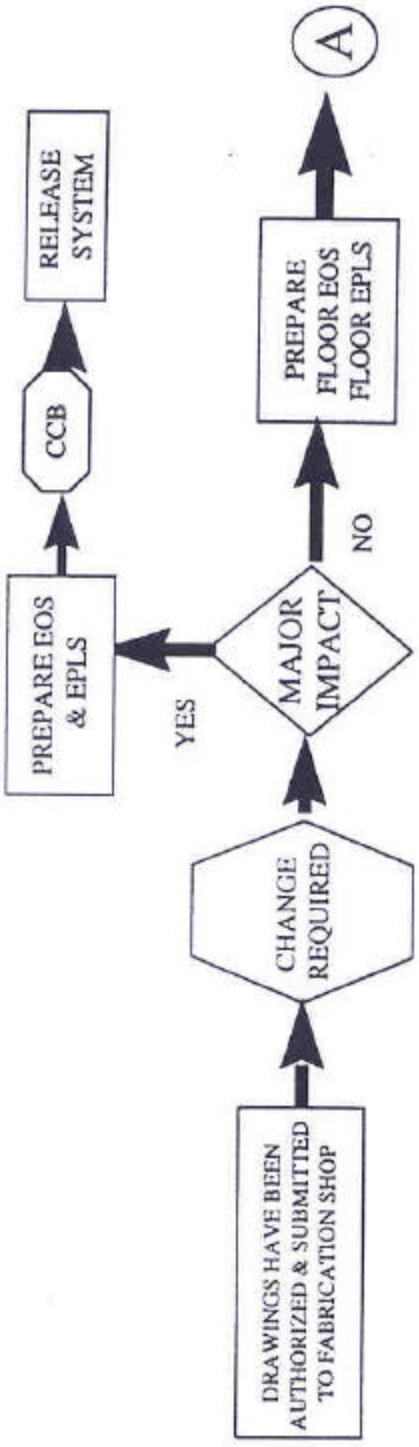

FIGURE 1. Configuration Management For Fabrication And Test Phase

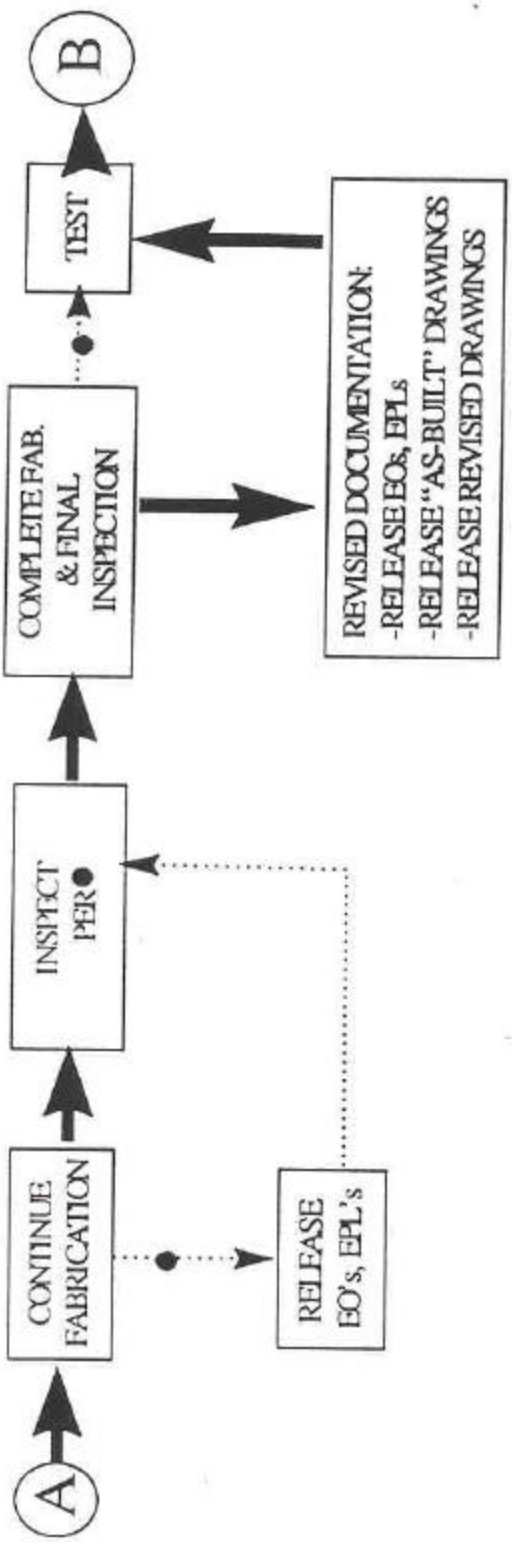

FIGURE 1. Configuration Management For Fabrication And Test Phase Continued

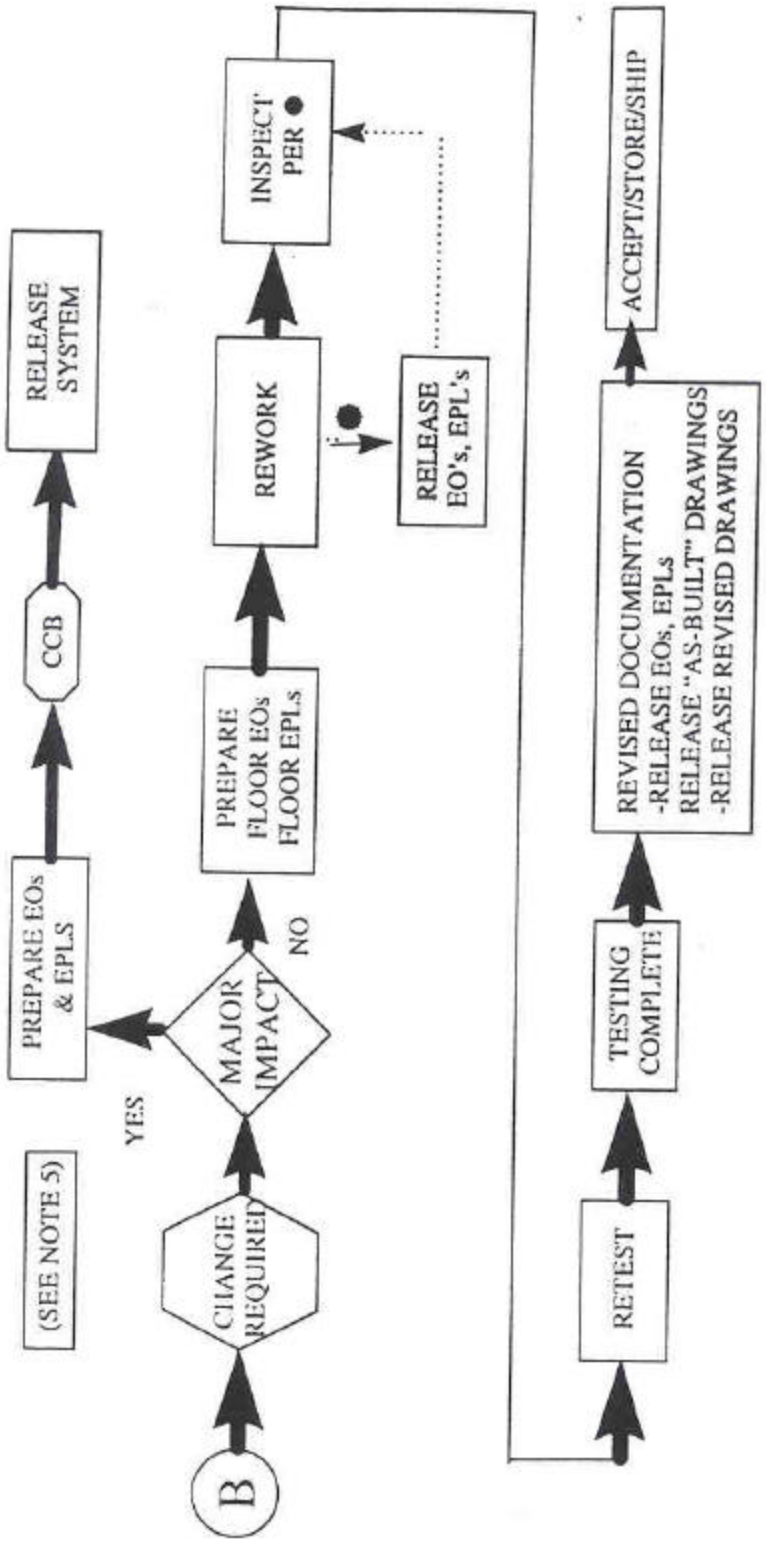

FIGURE 1. Configuration Management For Fabrication And Test Phase Continued

FIGURE 1. Configuration Management For Fabrication And Test Phase Continued

NOTES:
1. THIS PROCESS FLOW REPRESENTS;
(a) THE MINIMUM REQUIREMENTS, WHICH ARE DENOTED VIA THE BOLD LINES, THAT MUST BE SATISFIED, AND
(b) THE OPTIONS THAT ARE AVAILABLE TO PROJECT' MANAGEMENT THAT MAY BE DETERMINED NECESSARY FOR A SPECIFIC PROJECT BASED UPON ITS COMPLEXITY, USAGE, COST, ETC.
2. PROJECT MANAGEMENT IS RESPONSIBLE I-OR DETERMINATION OF THE SPECIFIC APPROACH TO BE IMPLEMENTED. DETAILS OF SAME WILL BE DOCUMENTED IN THE PROJECT ADDENDUM TO THIS CM PLAN.
3. PROJECT MANAGEMENT DETERMINES IF DRAWINGS WILL BE OFFICIALLY RELEASED. GENERALLY ALI, DEVELOPMENT FLIGHT DRAWINGS WILL BE RELEASED.
4. * DENOTES THE OPTIONS THAT PROJECT MANAGEMENT MAY SELECT. OPTIONS ARE ALSO DENOTED VIA DASHED LINES.
5. WHEN CCB ACTION IS REQUIRED, THE CCB PROCESS IS IN ACCORDANCE WITH FIGURE 3. (NOTE SHORTCUT FOR MINOR DRAWING CHANGES IF APPROVED BY A BLANKET CCBD.)
-MAJOR CHANGE IS ONE WHICH IMPACTS A BASELINED PERFORMANCE REQUIREMENT, OR HAS COST AND SCHEDULE IMPACT. A CHANGE WHICH IS NOT CLASSIFIED AS "MAJOR" IS A CASE IN WHICH THE DESIGN MUST BE ALTERED TO MEET A BASELINED REQUIREMENT (E.G. NEED TO INCREASE LENGTH OF A FASTENER, OR MODIFY DESIGN TO EASE MANUFACTURING WHILE STILL SATISFYING THE BASELINED REQUIREMENT.
6. DEVELOPMENT PROJECTS SHALL RELEASE DRAWINGS, EO's AND EPL's, INCLUDING THOSE RESULTING FROM FLOOR EO's & EPL's, W NEAR REAL TIME IN ORDER TO HAVE THE COMPLETE "AS-DESIGNED" BASELINE DEFINITION IN THE MSFC DRS IN NEAR REAL TIME.

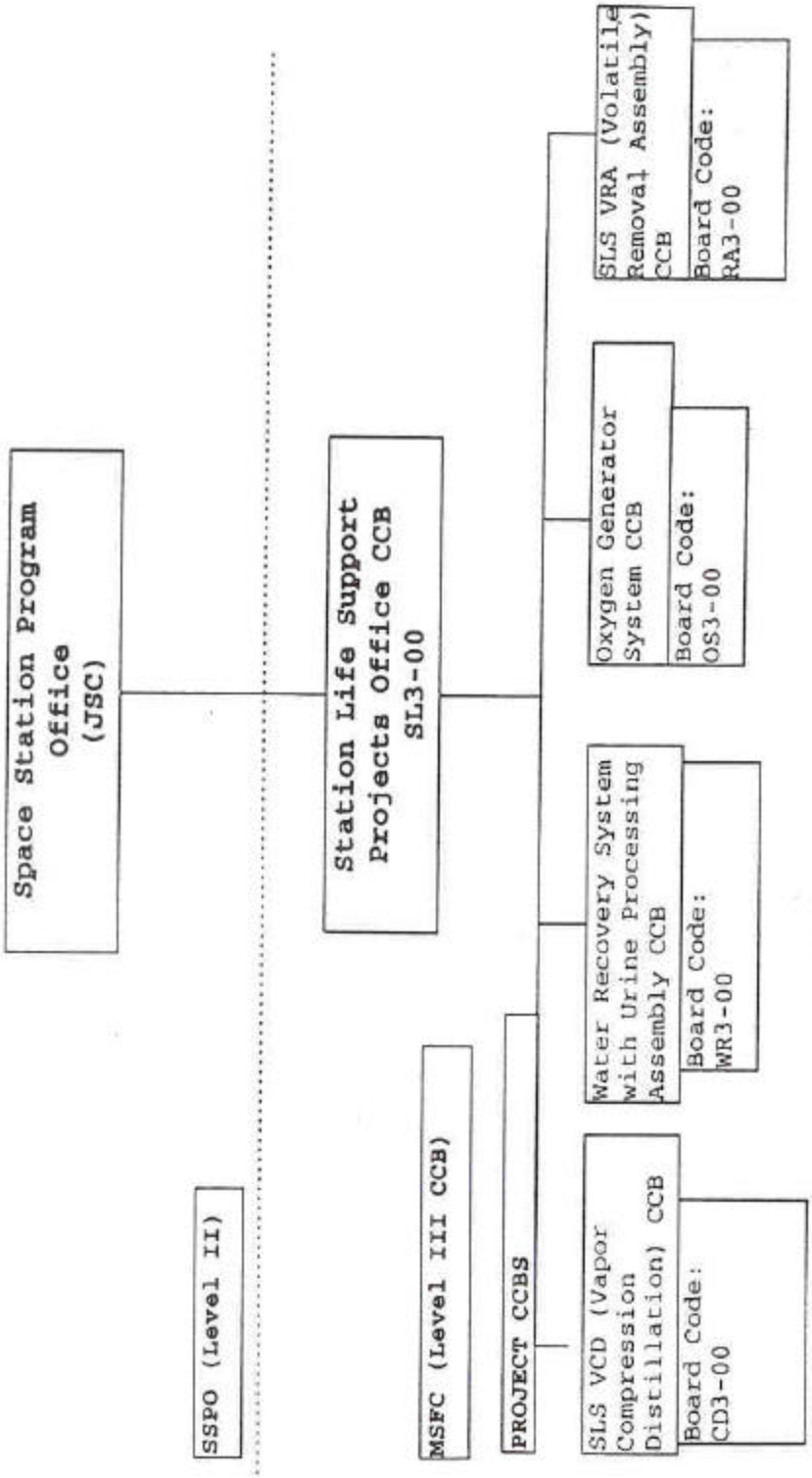

FIGURE 2. MSFC SLS CCB Organization

9.1.1 Space Station Program Office, JSC

The Space Station Program Office (SSPO) will control the ISS systems and segment specifications. Specific interfaces with international partners will be controlled at this level. The change control process identified in SSP 50123 is equivalent to a Level II CCB as specified in MSFC-P04.2.

9.1.2 MSFC SLS Projects

MSFC SLS Projects are controlled through the MSFC SLS Level III CCB structure. The CCB's baseline and control changes to project specifications and other project documents as required. The CCB's baseline and control changes to Interface/Integration Control Documents (ICD's) or Interface Definition Documents (IDD's) when the interface control is delegated by the SSPO. Drawings shall be baselined and controlled as specified in the appendices. MSFC SLS CCB's are detailed in the following subparagraphs and CCB activities are illustrated in Figures 3 through 5 or as otherwise noted in the appendices to this plan.

9.1.2.1 SLS General CCB

The SLS General CCB is chaired by the SLS Office Manager. The SLS Office Deputy Manager is the Alternate Chairman. The SLS CCB is responsible for documentation controlling all aspects of the SLS Projects, including baselining of this CM Plan, overall development schedules, review and implementation of SSPO requirements. SLS members and their responsibilities are defined in memorandum JA21 (98-06).

9.1.2.2 Vapor Compression Distillation Flight Experiment (SLS VCD) CCB

The SLS VCD CCB responsibilities and organization are defined in Appendix A of this plan. The SLS VCD CCB is chaired by the Project Manager. The SLS Office Manager is the Alternate Chairman.

9.1.2.3 Water Recovery System (WRS) CCB

The WRS CCB responsibilities and organization are defined in Appendix .B of this plan. The WRS CCB is chaired by the Project Manager. The SLS Office Manager is the Alternate Chairman.

9.1.2.4 Oxygen Generator System (OGS) CCB

The OGS CCB responsibilities and organization are defined in Appendix C of this plan. The OGS CCB is chaired by the Project Manager. The SLS Office Manager is the Alternate Chairman.

9.1.2.5 Volatile Removal Assembly Flight Experiment (SLS VRA) CCB

The SLS VRA CCB responsibilities and organization are defined in Appendix D of this plan. The SLS VRA CCB is chaired by the Project Manager. The SLS Office Manager is the Alternate Chairman.

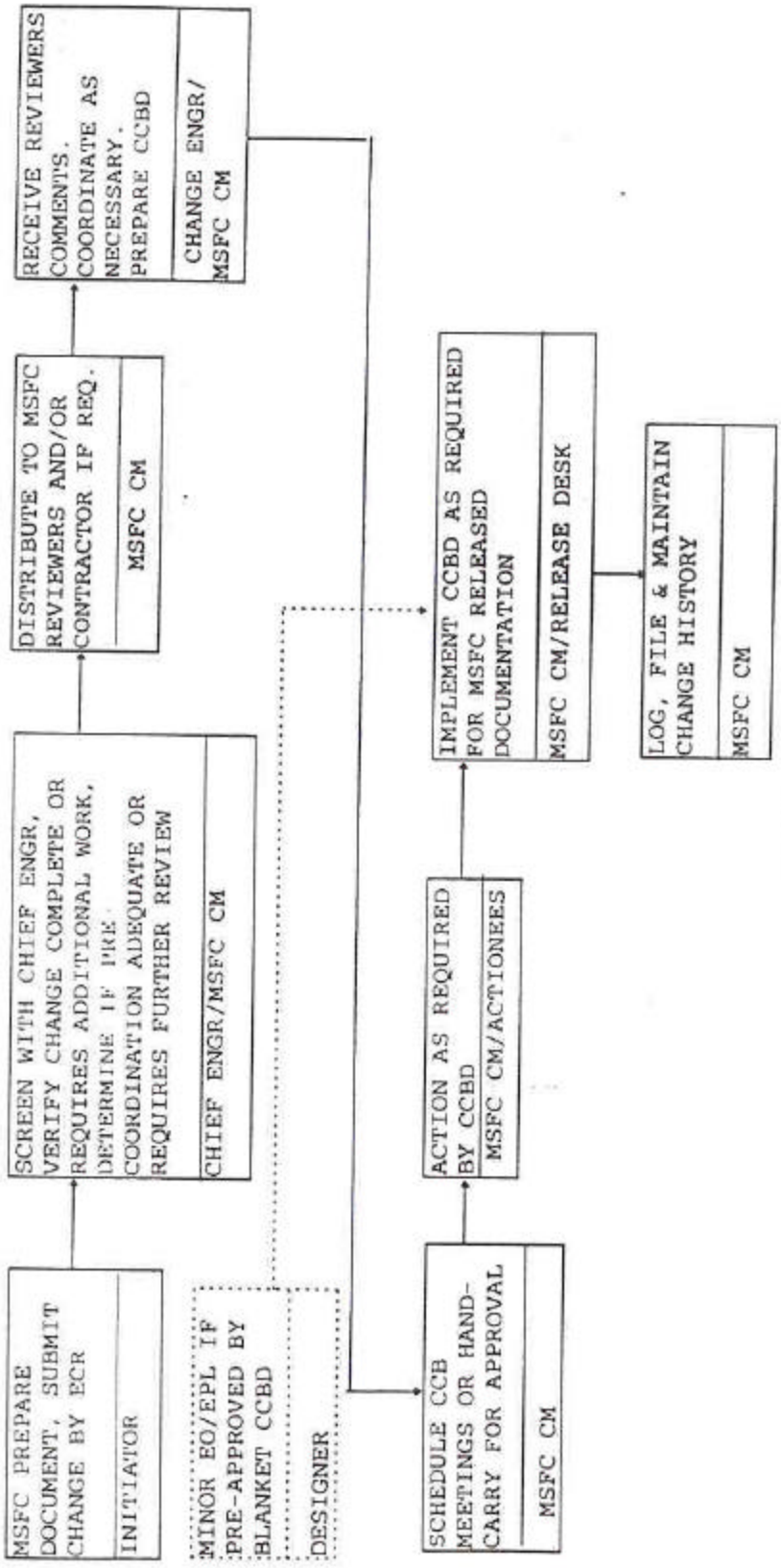

FIGURE 3. Process MSFC Submitted Changes

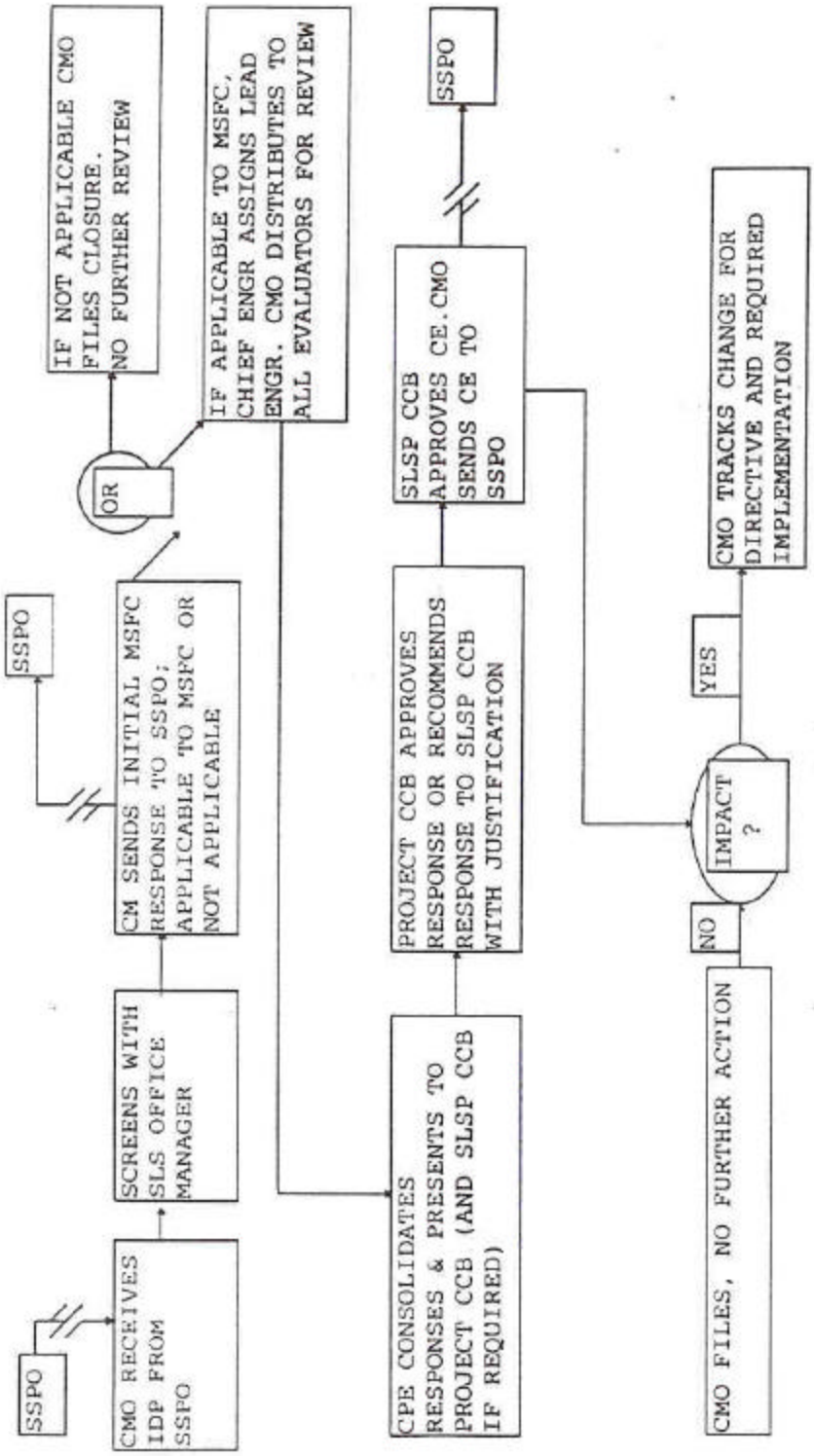

FIGURE 4. Evaluation And Response To SSPO Change Requests

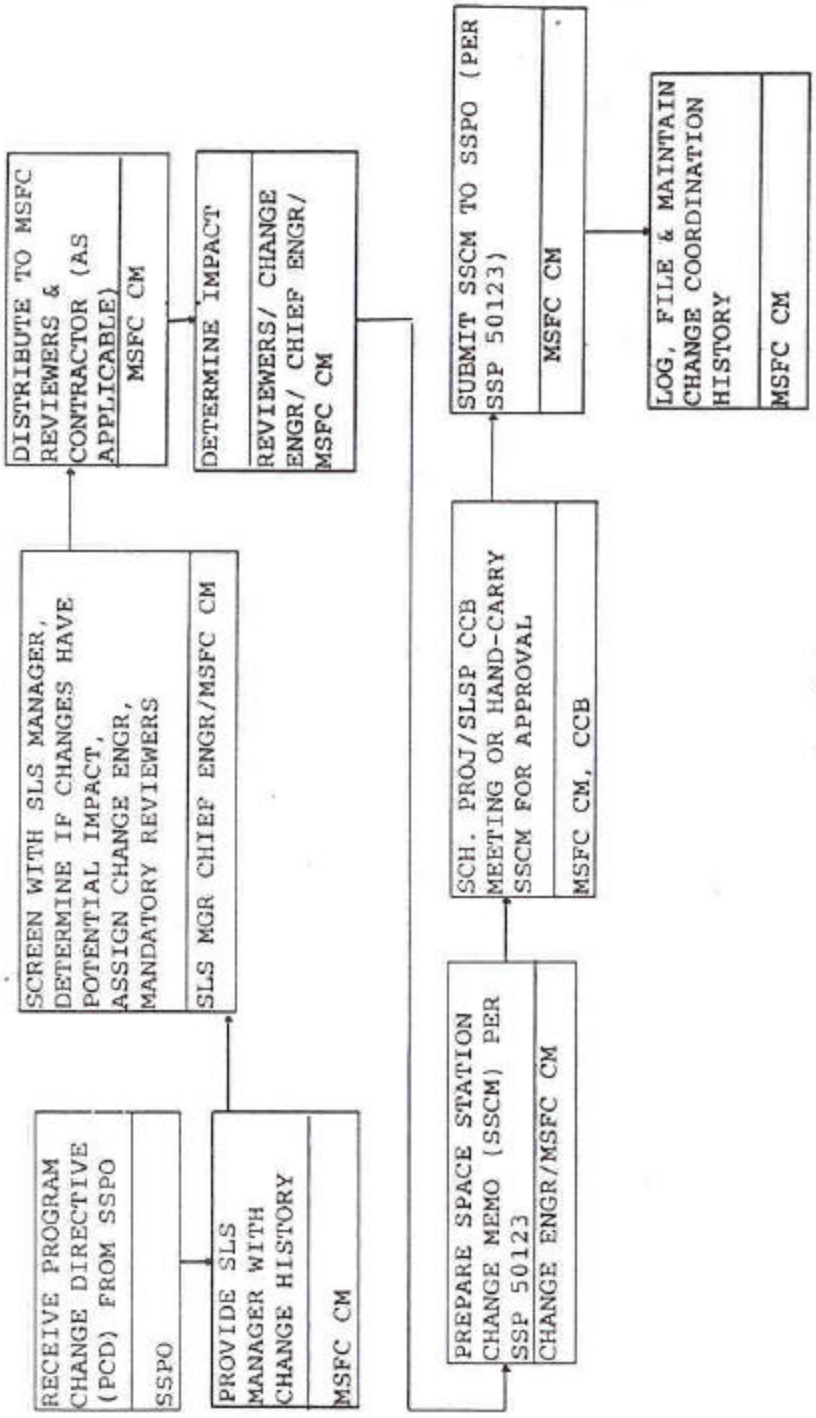

FIGURE 5. Review/Implement SSPO Change Directives

9.2 Disposition and Control of Changes

The SLS CCB Chairman will sign all CCBD's or Change Evaluations which impact budget, schedule, or affect more than one project or team CCBD's or CE's which pertain to one project and do not impact budget or schedule will normally be signed by the applicable project CCB Chairman. CCBD signature authority for drawings, engineering parts lists, and associated changes may be delegated to a lower level if indicated in the respective project appendix to this plan. The signature matrix and super signature authority for the projects are contained in the project appendices.

Baseline changes will be dispositioned by a Configuration Control Board Directive (CCBD). The CCBD shall specify one of the following dispositions:

a) Approved.
b) Approved with changes. Specific changes shall be clearly stated on the directive.
c) Disapproved. Reason for disapproval shall be stated on the directive.

The chairman or alternate chairman may also defer the change to be dispositioned at a later date. The CCBD shall document actions, actionees and suspense dates necessary to implement the authorized change. The CCBD shall be filed in the CMO and as a minimum copies shall be sent to the change initiator and any actionees. Impacts affecting the contract shall be forwarded to Procurement for disposition as defined in Section 12. Both MSFC in-house and contractor actionees shall provide evidence of closure of the action to the MSFC CMO.

9.3 Change Priorities

For MSFC changes, change priorities shall be as specified in MSFC-P04.2. Change priorities for contracted items shall be as defined in the contract.

9.4 Change Documentation

A change affecting the MSFC established baselines may be initiated by any MSFC organization by submittal of an Engineering Change Request (ECR) as detailed in MSFC-P04.2. Changes initiated by contractors shall be submitted by Engineering Change Proposal (ECP) in accordance with contract requirements and MM 8040.12. Before initiation of a change, preliminary informal interchange of engineering data between affected organizations is encouraged. This interchange will help determine the engineering feasibility or desirability of a change.

9.4.1 Change Requests

MSFC originated change requests shall be documented on an ECR, MSFC Form 2327, with attachment of other MSFC forms and supporting material for change definition and official release by the MSFC Release Desk. MSFC procedures for assembling a change package are contained in MSFC-STD-555.

Any contractor initiated changes shall be submitted on an ECP in accordance with the procedures specified in the contract.

9.5 Program Control Number (PCN)

The PCN is a unique identifier assigned by the CMO to a change package to assure complete change packaging and continuity in the overall tracking, statusing, and accounting activities for each change processed through the system The PCN is recorded on each piece of change documentation within a change package. All related change inputs will be identified using the same PCN, and become part of the same PCN file. The CMO will maintain a log of all PCN's issued. Revision letters, digits, or other modifiers for PCN's are prohibited.

9.6 Change Processing and Evaluation

All elements will conform to the following established procedure for processing and evaluating change requests. These procedures provide a consistent and efficient change process.

The CMO will be the focal point for the processing of all in-house and SSPO changes. When a change is received, the CMO will initiate the opening of a Program Control Number (PCN) file, in which all the related documentation pertinent to the change will be stored, and will initiate the action to enter the change into CPTAS at MSFC. The CMO will confer with the board chairman or alternate chairman/Chief Engineer, either through a screening group meeting or individually, to identify the CPE and any other individuals or organizations that may be impacted by the change, and determine from whom evaluations are required. The change request will be distributed to the mandatory evaluators and others as determined by the screening group. Changes involving contractors will be forwarded to the respective contractor(s) for evaluation. Any other identified external evaluators will be added. Notification will be provided identifying the CPE, the scheduled board date and a suspense for responding to the CPE. The transmittals may be by hard copy or electronic mail.

Design Leads will take action to evaluate the change for subsequent CCB action. Within the suspense time frame, the individual evaluators and ancillary elements will review the change from their perspective and complete their change evaluations (CE) on the form provided in the change
review package. Each evaluating element will forward the CE to the CMO and the CPE. The CPE will establish a unified position regarding the change and prepare a consolidated change evaluation. The CMO will assist the CPE in preparing the appropriate change documentation. The CMO will file all pertinent information in the PCN file. In the event a CPE receives a nonconcurrence CE, the CPE must work to resolve the disagreement. Disagreements which cannot be resolved between evaluators or design activities will be resolved by the CCB.

For changes involving SSPO baselined documentation a Space Station Change Request (SSCR) will be generated by the responsible individual. After boarding at the responsible MSFC CCB the SSCR will be submitted to the Space Station Control Board (SSCB) for technical approval. The SSCR will then be processed in accordance with SSP 50123.

Shuttle/Space Station payload interfaces are controlled by NSTS 21000-IDD-ISS. Processing flow of PIRN's to NSTS 21000-IDD-ISS is depicted in Figure 6. Program level ICD's will be processed in accordance with SSP 41170.

9.7 Deviations and Waivers

Deviations and waivers are proposed departures from requirement or hardware baselines. Deviations and waivers shall be submitted on Deviation/Waiver Approval Request Forms (MSFC Form 847.) and shall be dispositioned by the responsible Board. As authorized by MSFC-P13.1CO1, minor nonconformances not impacting level III requirements shall be processed by the organizational Material Review Board(s) if chartered by a project appendix, or by the MSFC Material Review Board, and documented on Discrepancy Record (DR) forms.

9.7.1 Deviations

A deviation is a specific written authorization, granted before manufacture, to depart from a particular baseline requirement for a limited application.

9.7.2 Waivers

A waiver is a written authorization accepting a departure, after occurrence, from a baseline requirement, normally limited to a single application or end item.

9.7.3 Deviations and Waivers Affecting ICD's

A proposed deviation or waiver that affects an ICD shall require submittal of a DAR. The deviation or waiver shall only apply to the EI effectivity on which the departure condition exists. The DAR will be transmitted to both sides of the affected interface for evaluation.

9.8 Field Engineering Change (FEC)

The FEC is used to authorize engineering changes to hardware at a NASA using site when time constraints do not allow preparation of an ECR/ECP . It should be used only for changes which require disposition within 24 hours. An FEC authorizes the change, but should be followed by a change request to update the affected "as-designed" documentation. The FEC shall be limited to one serial numbered item effectivity and shall be followed up by an ECR or ECP to implement changes in other serial numbered items of the same El. FEC numbers will be assigned and controlled by the MSFC site representative. FEC numbers shall be prefixed by the letters "FEC." Implementation of the FEC shall be documented on an Installation Notice Card (INC). Copies of the INC shall be sent to the CM office and the design activity.

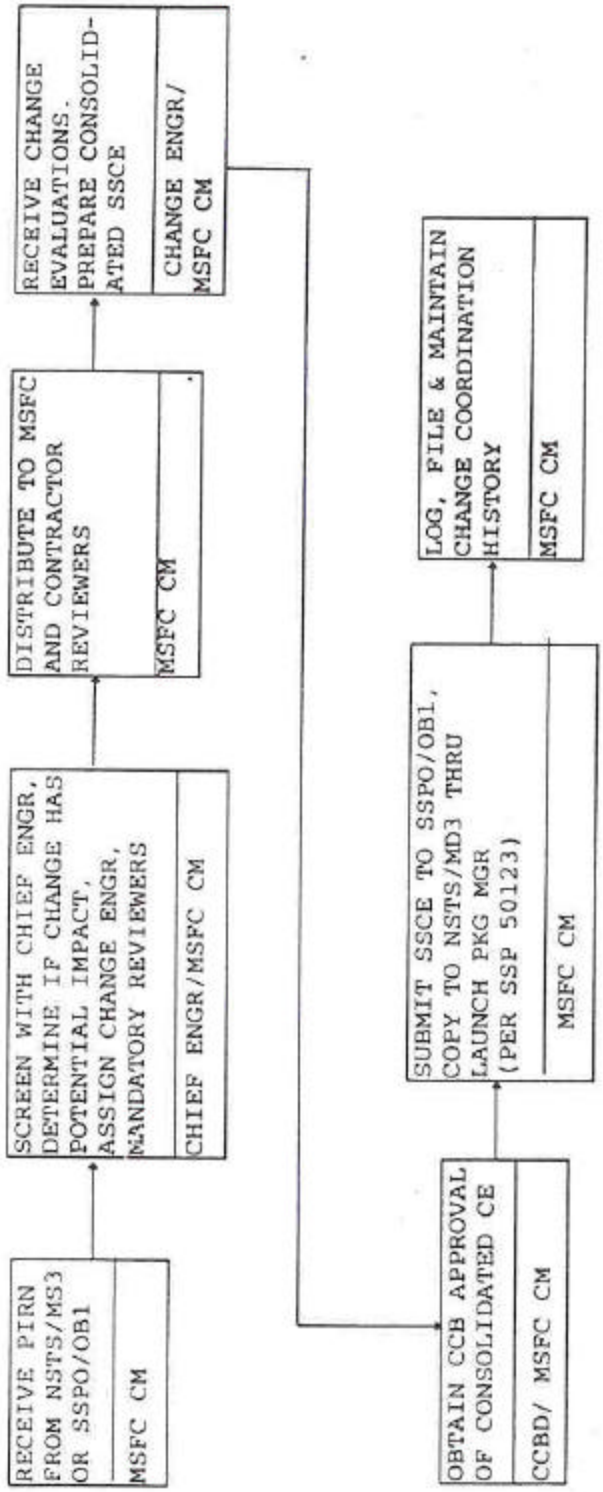

FIGURE 6. NSTS 21000-IDD-ISS PIRN Processing Flow

9.9 Modification Kits

After delivery and acceptance of a CI from or to another NASA agency or contractor, modification may be required to incorporate approved changes or correct non compliances. If hardware/software is required from the delivering agency, it shall be provided as a modification (mod) kit. The mod kit shall be proposed by change request and approved by the appropriate CCB before shipment. Mod kits shall be shipped by DD Form 1149, Government Shipping Document, and/or DD Form 250, Material Inspection and Receiving Report. A copy of the DD Form 1149 and/or DD Form 250 shall be forwarded to the CMO.

The mod kit shall contain all the hardware/software/documentation needed to correctly incorporate the required change. Modification Instructions serve as a check list for kit completeness and provide instructions for accomplishing the modification. The Modification Instructions should include the following information: Modification Instructions title, Modification Instructions number, authorizing change request number and PCN, date, any spares or manuals affected, safety considerations, Modification Instructions purpose, effectivity, list of parts/materials/documentation contained in the kit, instructions for mod kit installation, a list of any validation requirements, special handling/tools/safety equipment/test equipment required, estimated man-hours required, who prepared the kit, and who inspected the kit before shipment.

Installation of the Mod Kit shall be documented on MSFC-Form 2490, Installation Notice Card (INC). Copies of the INC shall be sent to the CM office and the design activity.

9.10 Floor EO's and Floor EPL's

Floor EO's and floor EPL's will be utilized in accordance with MSFC-STD-555, CM-INST-001, and CM-INST-003.

10.0 CONFIGURATION STATUS ACCOUNTING

Configuration status accounting at MSFC as specified in MSFC-P04.2 shall be accomplished by the CMO using the MSFC Change Processing Tracking, and Accounting System (CPTAS). Implementation and utilization of CPTAS shall be as specified in MSFC-MNL-1951. CM status reports shall be generated and distributed as required by project management. Available information shall be tailored to meet specific project needs. Reports that may be generated from data residing in CPTAS are listed in MSFC-MNL-1951.

11.0 CONFIGURATION VERIFICATION AND AUDITS

Verification of the hardware configuration assures that all requirements and engineering changes have been correctly translated into the hardware/software. Periodic verification is performed during design reviews when the progressive project baseline is established. On-going practices must also be established to ensure continuous verification. Tools used to achieve this continuous verification are the release system; accounting system; manufacturing practices; and inspection, audit, and surveillance practices.

a) Release and Accounting Systems

Both MSFC in-house and contractor release and accounting systems must be adequate to ensure that a closed loop clear audit trail exists in both directions between authorization and accomplishment and that the effectivities specified in changes are compatible with authorization.

b) Manufacturing Practices

Manufacturing must verify that all items are manufactured in accordance with released engineering data by assuring that:

1) Any engineering orders changing flight hardware shall reference the change request number which authorized the change.

2) Manufacturing controls are capable of identifying the specific engineering changes incorporated in specific parts/subassemblies.

c) Inspection, Audit, and Surveillance Practices

Quality control, independent of the technical and production functions, shall:

1) Assure that released engineering data is in accordance with requirements.

2) Audit manufacturing orders and assure that manufacturing and quality control documentation and software code is in accord with released engineering data.

3) Inspect material control, manufacturing and process control, and assembly operations and verify that each change is completely incorporated in the EI unit.

11.1 Reviews And Inspections

All MSFC SLS projects shall establish, conduct, and support design/integration reviews and configuration inspections in accordance with NMI 7120.5, MIL-STD-1521, SSP 41170, or MILSTD-498 for software. Reviews described may be held for the total project or for specific CI's.

11.1.1 Software Reviews

The basic objectives of a PDR for software may be met by a separate Software Specification Review (SSR). The SSR will determine that the software requirements specification, interface requirements, and operational concept form a satisfactory basis for proceeding into preliminary software design. A software Test Readiness Review may be conducted to verify that software is ready for testing and test procedures are complete. Reference MIL-STD-498 for software review requirements.

11.2 Configuration Audits

Functional Configuration Audits and Physical Configuration Audits will be performed per the requirements of MSFC-P04.2.

11.3 Configuration Management Audits

The CMO shall initiate and chair configuration management audits of in-house and contractor CM activities and records as necessary to verify the adequacy of configuration management procedures and the implementation of the requirements of this plan. Audits of contractor CM shall be to MSFC-PROC-1916. In-house CM Audits shall be performed according to the principles of MSFC-PROC-1916.

12.0 CONTRACTORIVENDOR CONTROL

Control of contractor/vendor CM shall be to the requirements of MM 8040.12 and/or as specified in the contract.

12.1 Change Classification For Contracted Items

Contractor initiated changes will be classified as either Class I or Class II. Class I changes are as defined in MM 8040.12 or MIL-STD-973 and per the following criteria unless modified by a project addendum or by contractual direction:

12.1.1 Class I Changes

A change to procured items shall be classified as Class I when any baseline documentation is affected. Class I criteria include the following:

a) Configuration of qualified engineering critical components. b) Configuration to the extent that modification action is required for EI's. c) Approved test and checkout requirements.

d) Documentation that is part of the product baseline (final acceptance of hardware/software) as detailed in MM 8040.12.

12.1.2 Class II Changes

A proposed engineering change shall be designated as Class II when it does not fall within the Class I definition.

13.0 RECORDS RETENTION

Quality Records are identified in each program specific Project Plan.

This Page Intentionally Left Blank

APPENDIX A. SLS VCD (Vapor Compression Distillation Flight Experiment)

A.1 Scope

This appendix defines the unique configuration management requirements for the SLS VCD Flight Experiment. This appendix is applicable to all engineering tasks required for the design and development of the SLS VCD Flight Experiment activities which will be performed under the cognizance of the SLS VCD Flight Experiment Project Manager.

A.2 Procedures

The following procedures will be utilized:

A.2.1 The signature requirements for the SLS VCD Flight Experiment documentation and documents to be released through CCB Directives shall be as defined in Table I.

A.2.2 The Document Release Authorities for documents to be baselined through the CCB are shown in Table I.

A.2.3 The flight SLS VCD components shall be manufactured only with released drawings.

A.2.4 Release of drawings is not required for non-flight hardware.

A.2.5 For new documentation, revised drawings or major design changes, the designer will submit an ECR listing all documents or drawings being released to the CCB Secretariat who will ensure that the package is complete (ECR, EPL, EO, DP/RS, Drawings, etc.) The CCB Secretariat will process the package for approval as detailed in Figure 3 of the basic plan. The MSFC Release Desk personnel, upon receipt of the package, will check for the signature of the Release Authority (See Table I) on the drawings and other documentation, as well as checking for the approved CCBD as the authority to release the package. It is the responsibility of the Release Authority to determine what other signatures are required.

A.2.6 For minor changes as defined in Figure 1, a blanket CCBD may be prepared showing the types of documentation to be released and the release authority. Once a blanket CCBD is on file at the MSFC Release Desk, the designer will deliver the package to be released to include the ECR, EO and/or EPL citing the blanket CCBD as authority for release. It is the responsibility of the designer to ensure that the change is minor as detailed in Figure 1 of the basic plan and to obtain team leader/organizational approval on the ECR. The MSFC Release Desk personnel will check only for reference to the blanket CCBD and designer/engineer signature, and manufacturing signature if a floor EO/EPL.

A.2.7 The Project MRB shall be responsible for assessing and dispositioning of all referred nonconformances to applicable drawings, specifications, test or other requirements. Reference MSFC-PLAN-2839.

The Board Code for SLS VCD CCB is CD3-00.

TABLE I: SLS VCD SIGNATURE APPROVAL MATRIX

Document Type	SLS VCD CCB (CD3-00)		Release Authorization		Drawing Checking	Test	Manufacturing	Quality	Stress	Materials	Design
Specification/Document	x		x		x	x		x	x	x	x
Deviation/Waiver	x					*	*	x	x	x	x
New Drawing	x		x		x		x	x	x	x	x
New Non-Parts Drawing	x		x		x						x
Drawing EO	x		x		x			*	*	*	x
Floor EO/EPL						*	x				x
Records Correction EO/EPL	x		x		x						x
Drawing Revision	x		x		x						x
Engineering Parts List Change	x		x		x						x

*As Required - signature requirement is determined by the Designer or Release Authorization

NOTES:

(1) The following personnel have SLS VCD Release Authorization/Super Signature authority:

Primary: SLS VCD Project Manager - Kathy Jones

Alternate: SLS VCD Chief Engineer - Dennon Clardy

(2) The Release Authorization ensures that change packages contain the technical concurrences required by the matrix.

(3) The Release Desk checks for the Release Authorization Signature on the Document signature page, Drawing/EPL, or EO, included in the the release package, plus a CCB Directive which approves the package.

APPENDIX B. WATER RECOVERY SYSTEM PROJECT

B.1 Scope

This appendix defines the unique configuration management requirements for the Water Recovery System (WRS) Project. This appendix is applicable to all engineering tasks required for the design and development of the WRS. All requirements of the basic SLS CM Plan apply to WRS except where those requirements are changed/further defined by the unique requirements defined in this appendix.

B.2 Water Recovery System Level BI Configuration Control Board (CCB)

WRS CCB charter and membership is identified in a charter memorandum issued by the SLS Manager. The Alternate Chairman has authority to act as CCB Chairman on any changes not affecting cost or schedule.

B.3 WRS Level III CCB Membership

The following offices shall be designated as members of the WRS CCB.

Project Manager:	CCB Chairman
SLS Manager:	Alternate Chairman
Chief Engineer	Second Alternate Chairman
Rack Integration Manager	
S&MA Representative	
Program Control	
Secretariat	

B.4 Signature Matrix

See Table II for WRS Project Authorization Matrix.

The Board Code for WRS CCB is WR3-00.

TABLE II: WRS SIGNATURE APPROVAL MATRIX

Document Type	WRS CCB (WR3-00)		Release Authorization		Drawing Checking	Test	Manufacturing	Quality	Stress	Materials	Design
Specification/Document	x		x		x	x		x	x	x	x
Deviation/Waiver	x					*	*	x	x	x	x
New Drawing	x		x		x		x	x	x	x	x
New Non-Parts Drawing	x		x		x						x
Drawing EO	x		x		x			*	*	*	x
Floor EO/EPL						*	x				x
Records Correction EO/EPL	x		x		x						x
Drawing Revision	x		x		x						x
Engineering Parts List Change	x		x		x						x

*As Required - signature requirement is determined by the Designer or Release Authorization

NOTES:

(1) The following personnel have WRS Release Authorization/Super Signature authority:

Primary: WRS Project Manager - Cindy Upton

Alternate: WRS Chief Engineer - Steve Newton

(2) The Release Authorization ensures that change packages contain the technical concurrences required by the matrix.

(3) The Release Desk checks for the Release Authorization Signature on the Document signature page, Drawing/EPL, or EO, included in the the release package, plus a CCB Directive which approves the package.

APPENDIX C. OXYGEN GENERATOR SYSTEM

C.1 Scope

This appendix defines the unique configuration management requirements for the Oxygen Generator System (OGS) Project. This appendix is applicable to all engineering tasks required for the design and development of the OGS. All requirements of the basic SLS CM Plan apply to OGS except where those requirements are changed/further defined by the unique requirements define in this appendix.

C.2 Oxygen Generator System Level III Configuration Control Board (CCB)

OGS CCB charter and membership is identified in a charter memorandum issued by the SLS Manager. The Alternate Chairman has full authority to act as CCB Chairman on any changes not affecting cost or schedule.

C.3 OGS Level III CCB Membership

The following offices shall be designated as members of the WRS CCB.

Project Manager:	CCB Chairman
SLS Manager:	Alternate Chairman
Chief Engineer	Second Alternate Chairman
Rack Integration Manager	
S&MA Representative	
Program Control	
Secretariat	

C.4 Signature Matrix

See Table III for OGS Project Authorization Matrix.

The Board Code for OGS CCB is OS3-00.

TABLE III: OGS SIGNATURE APPROVAL MATRIX

Document Type	OGS CCB (OS3-00)		Release Authorization		Drawing Checking	Test	Manufacturing	Quality	Stress	Materials	Design
Specification/Document	x		x		x	x		x	x	x	x
Deviation/Waiver	x					*	*	x	x	x	x
New Drawing	x		x		x		x	x	x	x	x
New Non-Parts Drawing	x		x		x						x
Drawing EO	x		x		x			*	*	*	x
Floor EO/EPL						*	x				x
Records Correction EO/EPL	x		x		x						x
Drawing Revision	x		x		x						x
Engineering Parts List Change	x		x		x						x

*As Required - signature requirement is determined by the Designer or Release Authorization

NOTES:

(1) The following personnel have OGS Release Authorization/Super Signature authority:

Primary: OGS Project Manager - Chris Bramon

Alternate: OGS Chief Engineer - Steve Newton

(2) The Release Authorization ensures that change packages contain the technical concurrences required by the matrix.

(3) The Release Desk checks for the Release Authorization Signature on the Document signature page, Drawing/EPL, or EO, included in the the release package, plus a CCB Directive which approves the package.

APPENDIX D. SLS VRA (Volatile Removal Assembly Flight Experiment)

D. l **Scope**

This appendix defines the unique configuration management requirements for the SLS VRA Flight Experiment. This appendix is applicable to all engineering tasks required for the design and development of the SLS VRA Flight Experiment activities which will be performed under the cognizance of the SLS VRA Flight Experiment Project Manager.

D.2 **Procedures**

The following procedures will be utilized:

D.2.1 The signature requirements for the SLS VRA Flight Experiment documentation and documents to be released through CCB Directives shall be as defined in Table IV.

D.2.2 The Document Release Authorities for documents to be baselined through the CCB are shown in Table N.

D.2.3 The flight SLS VRA components shall be manufactured only with released drawings.

D.2.4 Release of drawings is not required for non-flight hardware.

D.2.5 For new documentation, revised drawings or major design changes, the designer will submit an ECR listing all documents or drawings being released to the CCB Secretariat who will ensure that the package is complete (ECR, EPL, EO, DP/RS, Drawings, etc.) The CCB Secretariat will process the package for approval as detailed in Figure 3 of the basic plan. The MSFC Release Desk personnel, upon receipt of the package, will check for the signature of the Release Authority (See Table IV) on the drawings and other documentation, as well as checking for the approved CCBD as the authority to release the package. It is the responsibility of the Release Authority to determine what other signatures are required.

D.2.6 For minor changes as defined in Figure 1, a blanket CCBD may be prepared showing the types of documentation to be released and the release authority. Once a blanket CCBD is on file at the MSFC Release Desk, the designer will deliver the package to be released to include the ECR, EO and/or EPL citing the blanket CCBD as authority for release. It is the responsibility of the designer to ensure that the change is minor as detailed in Figure 1 of the basic plan and to obtain team leader/organizational approval on the ECR. The MSFC Release Desk personnel will check only for reference to the blanket CCBD and designer/engineer signature, and manufacturing signature if a floor EO/EPL.

The Board Code for SLS VRA CCB is VR3-00.

TABLE IV: SLS VRA SIGNATURE APPROVAL MATRIX

Document Type	SLS VRA CCB (VR3-00)		Release Authorization		Drawing Checking	Test	Manufacturing	Quality	Stress	Materials	Design
Specification/Document	x		x		x	x		x	x	x	x
Deviation/Waiver	x					*	*	x	x	x	x
New Drawing	x		x		x		x	x	x	x	x
New Non-Parts Drawing	x		x		x						x
Drawing EO	x		x		x			*	*	*	x
Floor EO/EPL						*	x				x
Records Correction EO/EPL	x		x		x						x
Drawing Revision	x		x		x						x
Engineering Parts List Change	x		x		x						x

*As Required - signature requirement is determined by the Designer or Release Authorization

NOTES:

(1) The following personnel have SLS VRA Release Authorization/Super Signature authority:

Primary: SLS VRA Project Manager - Kathy Jones

Alternate: SLS VRA Chief Engineer - Bob Bagdigian

(2) The Release Authorization ensures that change packages contain the technical concurrences required by the matrix.

(3) The Release Desk checks for the Release Authorization Signature on the Document signature page, Drawing/EPL, or EO, included in the the release package, plus a CCB Directive which approves the package.